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The Pell equation can be made an aid to the solution of all indeterminate equations of the second degree in two unknowns.*

II. Solution by Richard Morris, Rutgers College.

This equation is of the form $Dx^2 - Cy^2 = -H$ (see Chrystal's *Algebra*, Part II, page 450) and the integral values of x and y are dependent upon the expression of $\sqrt{CD}/D$ as a continued fraction, the value of x being equal to the numerator and that of y to the denominator of those convergents, where

$$(-1)^n M_n = -H.$$

Let n denote the number of the convergent, A_n the quotients, p_n/q_n the terms of the convergent, and M_n the $(n+1)$th rational divisor, and arrange these quantities in column form to exhibit the solutions. There will be an infinite number of solutions since $(-1)^n M_n = -1$ for all the odd convergents.

N	A_n	p_n	q_n	M_n
1	1	1	1	1
2	4	5	4	2
3	2	11	9	1
4	4	49	40	2
5	2	109	89	1
6	4	485	396	2
7	2	1,079	881	1
8	4	4,801	3,920	2
9	2	10,681	8,721	1

Thus $x = 1$, $y = 1$; $x = 11$, $y = 9$; $x = 109$, $y = 89$, etc., are integral solutions.

Also solved by C. E. Githens.

MISCELLANEOUS QUESTIONS.

Edited by R. D. Carmichael.

Note.—This department is designed to furnish a forum for the discussion of live questions in the teaching of collegiate mathematics and of difficulties actually encountered by any one who may desire the reaction of other workers in the same field. It is believed that much benefit may accrue from the interchange of ideas along these lines, and it is hoped that a widespread interest will develop in maintaining the department.

Editors.

QUESTION.

12. In view of the notation used by Professor Slobin in his "Note on Certain Algebraic Equations" in the April issue, pages 113–115, a discussion would be desirable as to the best notation for complex roots in general, and in particular for eliminating the conspicuous ambiguities introduced by the notation above cited.

REPLIES.

7. What place should be given to the history of mathematics in courses for prospective high school teachers, and why?

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* For an account of such solutions see "The Pell Equation," E. E. Whitford, *Publications of the College of the City of New York*, 1912, pages 60, 64, ff.

I. Remarks by G. A. Miller, University of Illinois.

The history of mathematics is one of the most useful phases of applied mathematics since it enables us to measure an important type of intellectual development at various periods. A study of some of the applications of mathematics frequently makes particular subjects both easier and more interesting. It also establishes contact with other subjects and thus tends towards greater unity in the student's knowledge.

It seems to me that the prospective high school teacher should have a course in the history of mathematics extending over at least five hours per week for one semester. One difficulty is to find teachers in our universities and normal schools who are really prepared and willing to give such a course. After various trials I have come to the conclusion that a course in the history of elementary mathematics is very difficult and requires an unusual amount of preparation on the part of the teacher.

In the opening article of volume 14, February, 1914, of the *Bibliotheca Mathematica,* the noted mathematical historian, G. Eneström, considers the question of teaching the history of mathematics in the secondary schools. He emphasizes the fact that it is very difficult to secure accurate information as regards many of the most important historical questions in view of the many incorrect statements which appear even in the best histories of mathematics. Those who read only the English language are at a great disadvantage since no extensive history of mathematics has ever appeared in this language.

Notwithstanding these difficulties it seems to me that a course in the history of mathematics should be regarded as an essential element in the training of the high school teacher. Such a course should be one of the most useful means to impress the important fact that statements found in books must generally be subjected to a careful thought analysis in order to render them helpful for arriving at truths. It should also give a broader meaning to the various mathematical subjects and lead to a deeper interest by adding the dynamic element of development to the various mathematical concepts.

II. Remarks by W. T. Stratton, Kansas State Agricultural College.

Every prospective high school teacher should be given an opportunity to become familiar with the history of the mathematics he will teach. The course need not be very extensive but should have at least two or three hours per week throughout the senior year devoted to it. This course should not only take up the history of the different subjects but should also go into the biographies of some of the best known mathematicians. Mathematics has a history that begins with the history of the race. It has held the attention of some of the greatest men of all times. The prospective mathematics teacher should be given a chance to receive the inspiration that will come to him by a study of the lives of these men. As he goes out to teach in the high schools he will find that new spirit and new life can often be put into his courses if he is able to point out occasionally some interesting historical facts connected with the development of the subject in hand. Pupils, too, are always interested in men and if the subject is developed in connection with the facts concerning men who have made mathematical history they will likely look upon the subject with more interest and enthusiasm.

A course in the history of mathematics will enlarge the teacher's vision. He should be able to see the points of difficulty in the development of the subject by the race and should be better prepared to take the pupils over these difficulties. He will see the dependence and interdependence of arithmetic, algebra, and geometry. The three merge into each other so gradually that the dividing line cannot be determined. Nothing will help more than a good course in the history of the subject to give the teacher the proper attitude toward these divisions.

NOTES AND NEWS.

UNDER THE DIRECTION OF FLORIAN CAJORI.

As previously announced in these columns, Professor Cajori will be in Europe during the coming year. During his absence, Professor W. D. Cairns, of Oberlin College, Ohio, will act as chairman of the committee on Notes and News, and all contributions of this character should be sent directly to him.

Dr. C. L. BOUTON of Harvard University has been promoted to an associate professorship of mathematics.

The *Educational Review* for May contains an article on "Mathematics for culture" by Professor N. J. LENNES, of the University of Montana.

Dr. C. KÜSCHKE, formerly instructor at the University of California, where he took his doctorate, has accepted an instructorship in mathematics for the coming year at the University of Washington. He has recently been attending lectures at the University of Chicago.

Dr. G. N. GREEN, of the College of the City of New York, has accepted an instructorship in mathematics at Harvard University.

Mr. LESTER HILL, formerly a graduate student at Columbia University and later at the University of Chicago, has been made assistant professor in mathematics at the University of Montana.

Professor N. J. LENNES, head of the department of mathematics at the University of Montana, will spend the coming summer abroad.

Bulletin No. 323, of the University of Texas, contains an article by Dr. EDWARD L. DODD on "The error-risk of the median compared with that of the arithmetic mean."